

CLAIM LISTING

Please find below a complete listing of presently pending claims with status identifiers. This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) A process for forming a nanostructure comprising:
providing a metal to a reaction chamber, wherein the metal is provided to the reaction chamber as a metal layer formed on a surface;
heating the reaction chamber to a reaction temperature, the reaction temperature being greater than the melting point of the metal such that the metal layer becomes molten, wherein the reaction temperature is between 650°C and about 1500°C;
flowing a first vapor stream comprising a first reactant through the reaction chamber; and
reacting the molten metal in the layer with the first reactant at the reaction temperature and ambient pressure via a process consisting of a thermal chemical vapor deposition reaction process to form a first reaction product comprising the metal and the first reactant, wherein the first reaction product exhibits low solubility and low wetting characteristics with respect to the molten metal in the layer; and
forming a nanowire or a nanobelt comprising the first reaction product.
2. (Original) The process of claim 1, wherein the metal is a low melting point metal.
3. (Original) The process of claim 1, wherein the metal is selected from the group consisting of gallium, indium, zinc, tin and cadmium.
4. (Previously Presented) The process of claim 1, wherein the reaction temperature is at least about 200°C above the melting point of the metal.
5. (Previously Presented) The process of claim 1, wherein the reaction temperature is at least about 250°C above the melting point of the metal.
6. (Previously Presented) The process of claim 1, wherein the reaction temperature is between about 700°C and about 1500°C.

7. (Previously Presented) The process of claim 1, wherein the reaction temperature is between about 700°C and about 1200°C, and the nanostructure is a nanowire.

8. (Previously Presented) The process of claim 1, wherein the reaction temperature is between about 1000°C and about 1500°C, and the nanostructure is a nanobelt.

9. (Currently Amended) The process of claim 1, wherein the first reactant is a disassociation product of a material selected from the group consisting of oxygen, ammonia, hydrogen sulfide, phosphine, arsine, and fluorine.

10. (Original) The process of claim 1, wherein the nanostructure is formed on a substrate selected from the group consisting of silicon, quartz, glass carbon, graphite, pyrolytic boron nitride and alumina.

11. (Currently Amended) The process of claim 1, further comprising:
ceasing the flow of the first vapor stream;
flowing a second vapor stream through the reaction chamber subsequent to the flow of the first vapor stream, wherein the second vapor stream comprises a second reactant, different than the first reactant; and
reacting the molten metal in the layer with the second reactant via a thermal chemical vapor deposition process at ambient pressure, wherein the reaction product of the molten metal and the second reactant comprises the metal and the second reactant and exhibits low solubility and wetting characteristics with respect to the molten metal in the layer, the nanostructure further comprising the reaction product of the molten metal and the second reactant.

12. (Currently Amended) The process of claim 11, wherein the second reactant is a disassociation product of a material selected from the group consisting of oxygen, ammonia, hydrogen sulfide, phosphine, arsine, and fluorine.

13. (Original) The process of claim 11, further comprising flowing an inert gas through the reaction chamber subsequent to the flow of the first vapor stream and prior to the flow of the second vapor stream.

14. (Original) The process of claim 1, wherein the reaction product is a semiconductor material, the vapor stream further comprising a dopant, the nanostructure comprising a doped semiconductor material.

15. (Currently Amended) A process for forming a hybrid nanostructure comprising:

providing a metal to a reaction chamber, wherein the metal is provided to the reaction chamber as a metal layer formed on a surface;

heating the reaction chamber to a reaction temperature, the reaction temperature being greater than the melting point of the metal such that the metal becomes molten, wherein the reaction temperature is between 650°C and about 1500°C;

flowing a vapor stream ~~comprising two or more reactants~~ through the reaction chamber, the vapor stream comprising two or more reactants including a first reactant and a second reactant, wherein the two or more reactants have similar affinity for the molten metal;

reacting the molten metal in the layer with the two or more reactants simultaneously at ambient pressure via a process consisting of a thermal chemical vapor deposition reaction process to form two or more reaction products including a first reaction product and a second reaction product, the first reaction product comprising the first reactant and the metal and the second reaction product comprising the second reactant and the metal, ~~the first and second reaction products of the molten metal with each of the two or more reactants~~ exhibiting low solubility and low wetting characteristics with respect to the molten metal; and

forming a nanowire or a nanobelt comprising a hybrid of the two or more reaction products.

16. (Previously Presented) The process of claim 15, wherein the metal is selected from the group consisting of gallium, indium, zinc, tin and cadmium.

17. (Original) The process of claim 16, wherein the reaction temperature is at least about 200°C above the melting point of the metal.

18. (Currently Amended) The process of claim 15, wherein the ~~vapor stream comprises two or more reactants~~ first reactant and the second reactant are disassociation products of a first material and a second material independently selected from the group consisting of hydrogen sulfide, phosphine, arsine, and fluorine.

19. (Previously Presented) The process of claim 15, wherein the reaction temperature is between about 700°C and about 1500°C.

20. (Previously Presented) The process of claim 15, wherein the reaction temperature is between about 700°C and about 1200°C, and the nanostructure is a nanowire.

21. (Previously Presented) The process of claim 15, wherein the reaction temperature is between about 1000°C and about 1500°C, and the nanostructure is a nanobelt.

22. (Currently Amended) A process for forming a hetero-nanostructure comprising:

providing a metal to a reaction chamber, wherein the metal is provided to the reaction chamber as a metal layer formed on a surface;

heating the reaction chamber to a reaction temperature, the reaction temperature being greater than the melting point of the metal such that the metal becomes molten, wherein the reaction temperature is between 650°C and about 1500°C;

flowing a first vapor stream comprising a first reactant through the reaction chamber;

reacting the molten metal in the metal layer with the first reactant at ambient pressure via a process consisting of a thermal chemical vapor deposition reaction process wherein the first reaction product thus obtained exhibits low solubility and low wetting characteristics with respect to the molten metal, the first reaction product comprising the first reactant and the metal;

forming a first length of a nanowire or a nanobelt comprising the first reaction product;

flowing a second vapor stream through the reaction chamber subsequent to the flow of the first vapor stream, wherein the second vapor stream comprises a second reactant different from the first reactant;

reacting the second reactant with the metal in the metal layer at ambient pressure via a process consisting of a thermal chemical vapor deposition process, wherein the second reaction product thus obtained exhibits low solubility and low wetting characteristics with respect to the molten metal, the second reaction product comprising the second reactant and the metal; and

forming a second length of the nanostructure adjacent the first length, the second length comprising the second reaction product.

23. (Original) The process of claim 22, wherein the metal is a low melting point metal.

24. (Previously Presented) The process of claim 22, wherein the reaction temperature is at least about 200°C above the melting point of the metal.

25. (Previously Presented) The process of claim 22, wherein the reaction temperature is between about 700°C and about 1500°C.

26. (Previously Presented) The process of claim 22, wherein the reaction temperature is between about 700°C and about 1200°C, and the nanostructure is a nanowire.

27. (Previously Presented) The process of claim 22, wherein the temperature is between about 1000°C and about 1500°C, and the nanostructure is a nanobelt.

28. (Currently Amended) The process of claim 22, wherein the first reactant and the second reactant are disassociation products of materials independently selected from the group consisting of oxygen, ammonia, hydrogen sulfide, phosphine, arsine, and flourine ~~and mixtures thereof~~.

29. (Original) The process of claim 22, further comprising flowing an inert gas through the reaction chamber subsequent to flowing the first vapor stream through the reaction chamber and prior to flowing the second vapor stream through the reaction chamber.

30. (Currently Amended) A process for forming a doped nanostructure comprising:

providing a metal to a reaction chamber, wherein the metal is provided to the reaction chamber as a metal layer formed on a surface;

heating the reaction chamber to a reaction temperature, the reaction temperature being greater than the melting point of the metal such that the metal becomes molten, wherein the reaction temperature is between 650°C and about 1500°C;

flowing a vapor stream comprising a reactant and a dopant through the reaction chamber; and

reacting the molten metal in the metal layer with the reactant at ambient pressure via a process consisting of a thermal chemical vapor deposition reaction process to form a first reaction product comprising the reactant and the metal, wherein the first reaction product exhibits low solubility and low wetting characteristics with respect to the molten metal; and

forming a nanowire or a nanobelt comprising the first reaction product and the dopant.

31. (Original) The process of claim 30, wherein the metal is selected from the group consisting of gallium, indium, zinc, tin and cadmium.

32. (Previously Presented) The process of claim 30, wherein the reaction temperature is at least about 200°C above the melting point of the metal.

33. (Previously Presented) The process of claim 30, wherein the reaction temperature is between about 700°C and about 1500°C.

34. (Previously Presented) The process of claim 30, wherein the reaction temperature is between about 700°C and about 1200°C, and the nanostructure is a nanowire.

35. (Previously Presented) The process of claim 30, wherein the temperature is between about 1000°C and about 1500°C, and the nanostructure is a nanobelt.

36. (Currently Amended) The process of claim 30, wherein the reactant is oxygen and the dopant is the disassociation product of a material selected from the group consisting of ammonia, hydrogen sulfide, phosphine, arsine, and fluorine.

37. (Currently Amended) The process of claim 30, wherein the reactant is nitrogen ~~ammonia~~ and the dopant is a disassociation product of a material selected from the group consisting of hydrogen sulfide, phosphine, arsine, and fluorine.

38-45 Cancelled.